

REMARKS

Favorable reconsideration is respectfully requested.

The claims are 1-14.

Claims 1-8 and 10 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (U.S. 5,599,640) in view of Sawa et al. (U.S. 6,030,724).

This rejection is respectfully traversed.

In response to the first Official Action dated October 14, 2003, Applicants amended claim 1 to recite that the hydrogen-absorbing alloy forming the negative electrode is necessarily limited to a fluorinated hydrogen absorbing alloy in order to overcome the 35 U.S.C. 102 rejection of original claim 1 as being anticipated by the Lee et al. reference.

While withdrawing the 35 U.S.C. 102 rejection, claims 1 to 8 and 10 are now rejected under 35 U.S.C. 103 (a) as being obvious over Lee et al. in view of the newly cited Sawa et al. reference.

The rejection recognizes that the Lee reference does not expressly teach that the hydrogen absorbing alloy is fluorinated, as recited in claim 1 (page 3, first full paragraph of the Action).

On the other hand, the rejection contends that Sawa et al. is directed to a hydrogen storage alloy and, in column 4, line 21, the reference teaches that the alloy may be subjected to a fluorination treatment.

In reply, in the Sawa reference, the fluorination treatment is suggested merely as one of various alternative or equivalent treatments including a plating treatment with, e.g., Cu and Ni, a nitriding treatment, a carbonizing treatment, a boriding treatment, an alkalinizing treatment and a fluorinating treatment. Moreover, the object of these treatments of the alloy is to curb the comminution and deterioration of the alloy particles by the absorption and release of hydrogen (column 4, lines 17-23).

On the other hand, curbing of mechanical degradation such as comminution or deterioration of the alloy powder is not the object of the fluorination of the alloy material in the present invention. See page 8, paragraph [0033] of the present application, according to which

fluorination of the alloy material forming the negative electrode has an effect to promote generation of hydrogen ions, i.e. negative hydrogen ions H^- , now called protides. Namely the object of fluorination of the negative electrode is to improve the efficiency of the electrochemical process at the negative electrode.

Although it is unnecessary to discuss the likely mechanism involving the negative hydrogen ions in detail, it was unexpected that, as is graphically shown in Fig. 3 of the present specification, the performance of fuel cells relative to the current density vs. voltage characteristic can be greatly improved by the use of a fluorinated electrode (solid line curve) as compared with an unfluorinated electrode (broken line curve). See Example 1. The Sawa reference is absolutely silent on such an effect of improvement in the performance of liquid fuel cells accomplished by fluorination of the electrode alloys.

More importantly, it should be noted that the subject matter of the Sawa patent is a secondary battery using a hydrogen storage alloy and not a liquid fuel cell as in the present invention or in Lee et al.

It is apparent that there is a great difference in constitution and electrochemical mechanisms between a secondary battery and a liquid fuel cell and, a material employed in one would not motivate the art-skilled to employ such material in the other.

Accordingly, the rejection of claim 1 is based on a reconstruction of the presently claimed invention, relying on the Applicants' own disclosure from the present application, in view of the absence of any linking disclosure between a secondary battery and a liquid fuel cell.

In any event, no one skilled in the art of liquid fuel cells and informed of the Lee and Sawa disclosures could be motivated to replace the negative electrode of Lee with an electrode made from a fluorinated hydrogen absorbing alloy even if he were desirous of improving the efficiency of hydrogen ion or protide generation in liquid fuel cells.

For the foregoing reasons, it is apparent that the rejection of claims 1-8 and 10 over Lee et al. in view of Sawa et al. is untenable.

With regard to the rejection of claim 9 as unpatentable over Lee et al. in view of Sawa et al. as above and further in view of Narayanan (U.S. 6,485,851), it is clear that Narayanan cannot overcome the deficiencies of the above-discussed references.


Similar comments are applicable to the rejection of claims 11-14 over Lee et al. in view of Sawa et al. and further in view of Wang.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

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